IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Lolayekar, Santosh C., et al.		
Serial No.	10/051,321	Group Art Unit:	2152
Filed:	January 18, 2002	Examiner:	Refai, Ramsey
Title:	Storage Switch for Storage Area Network		

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Enclosed is Appellants' Appeal Brief pursuant to 37 C.F.R. § 41.37 in connection with the Notice of Appeal filed March 19, 2007 from the final rejection of Claims 1-6 and 8-44 in the Office Action of December 20, 2006 ("Office Action"). The fees for the Appeal Brief for a Large Entity are enclosed.

I. REAL PARTY IN INTEREST

The real party in interest is EMC Corporation, a corporation of the Commonwealth of Massachusetts, a Large Entity.

II. RELATED APPEALS AND INTERFERENCES

There are no pending appeals, interferences or judicial proceedings known to Appellants, to Appellants' legal representative, or to Assignee which may be related to, directly effect, be effected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1 – 6 and 8 - 44 are pending; Claim 7 has been cancelled; Claims 1 – 6 and 8 - 44 stand finally rejected; and Claims 1 – 6 and 8 - 44 are being appealed.

IV. STATUS OF AMENDMENTS

There are no pending un-entered Amendments following the Final Rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A. Concise *Explanation of Subject Matter Claimed*

The claimed invention relates to multi-protocol storage networks such as SANs, and to switches, networks and methods that afford high bandwidth storage command processing of packets for switched-based storage operations such as

classification, virtualization and protocol translation *[specification, pg. 24, lns. 7 –10]* without buffering of the packets. This enables wire speed processing of packets, i.e., without introducing any more latency than would be introduced by a switch that merely performed a switching or routing function. *[specification, pg. 6, lns. 10 –24.]* The invention classifies packets (as control or data packets), virtualizes packets (converts from a virtual address to a physical address), and translates the protocol of packets, all entirely within an intelligent storage switch which distributes intelligence at every switch port. This avoids the necessity of the discrete, separate appliances and gateways that characterize the prior art. The switch also affords serverless storage services such as mirroring, mirroring over a slow link, snapshot, virtual target cloning (replication), third party copy, periodic snapshot and backup, and restore *[specification, pgs.6, ln. 25 – pg. 7, ln. 12]*.

Figures 3 - 5 illustrates a system 300, 402, 404 that includes storage switches 304 in accordance with the invention that interconnect a plurality of servers (initiators) 302 with a plurality of storage devices (targets) 306. The connections between the servers and the switches and between the switches and the storage devices can utilize any protocol *[specification, pgs.11, ln. 14 – pg. 12, ln. 1]*. As shown in Figure 6, the storage switches 304 may comprise a plurality of linecards 602-606, fabric (switching matrix) cards 608, and system control cards 610. Figure 7 is a functional block diagram of a generic linecard 700. Each switch port 702 (for ingress and egress of packets) is associated with a Storage Processor Unit (SPU) 701 that processes data traffic for “wire speed” operations. Each SPU 701 comprises a Packet Aggregation and Classification Engine (PACE) 704 that classifies each packet

as a data or control packet and forwards control packets to a CPU 714 and data packets to a PPU 706. This enables the switch to perform switched based storage operations such as virtualization and protocol translation at wire speed without using the store-and-forward (i.e., buffering) approach of conventional systems *[specification, pgs. 16, ln. 20 – pg. 18, ln. 8]*. Switched-based storage command processing operations are performed by the SPUs and the PPUs of the linecards 700 of the switch 304. *[specification, pg.24, lns. 6 – 13]*.

Figures 9a-b, 12a-b, and 13a-b illustrate the classification operations (methods) performed by the switch to classify packets as data or control; Figures 14 – 23 illustrate various aspects of virtualization processes according to the invention performed by the switch; and the specification describes at pages 43-55 protocol translation operations according to the invention that are performed by the switch.

B. Correspondence Between the Claims and the Specification

The following indicates the correspondence between the specification and the drawings for the subject matter defined by the independent claims on appeal and any dependent claim separately argued.

Claim 1

1. A switch *[304, Fig. 6; specification pg. 11, lns. 14-20]* for use in a network *[300, 402, 404, Figs. 3-5; specification pg. 11, ln. 14 - pg. 12, ln. 22]* comprising:

a plurality of linecards *[700, Fig. 6; specification pg. 14, lns. 23-27]* each including:

a plurality of ports *[702, Fig. 7; specification pg. 16, ln. 26]*; and

a plurality of storage protocol processing units *[701, Fig. 7; specification pg. 17, lns. 11-13]*, wherein each storage protocol processing unit is associated with at least one port *[specification pg. 17, lns. 11-12]* and performs storage command processing for commands received at said at least one port *[specification pg. 24, lns. 7-16]*, thereby distributing processing resources amongst linecard ports *[specification pg. 6, ln. 25 – pg. 7, ln. 7; pg. 13 lns. 9-11]*, and wherein the switch performs said storage command processing of packets without buffering the packets *[specification pg. 6, lns. 15-22; pg. 18, lns. 12-14; pg. 24, lns. 7-16]*.

Claim 8

8. The switch of claim 1, wherein the switch is capable of processing packets at wire speed *[specification pg. 18, lns. 6-8; pg. 24, lns. 7-13]*.

Claim 9

9. The switch of claim 1, wherein the switch is capable of receiving a packet at a first port *[702, Fig. 6; specification pg. 11, lns 14-20]* of a first linecard *[700, Fig. 6; specification pg. 14, lns. 23-27]* destined for a virtual target and formatted in accordance with a first protocol *[specification pg. 11, lns. 21-27; pg. 43, ln. 25 – pg. 44, ln. 2]*, determining if the packet is a data or control packet *[specification pg. 17, lns. 21-24]*, and if the packet is a data packet, sending the packet formatted in accordance with a second protocol to a physical target

[specification pg. 11, lns. 21-27; pg. 43, ln. 25 – pg. 44, ln. 2], all without buffering the packet *[specification pg. 6, lns. 15-22; pg. 18, lns. 12-14; pg. 24, lns. 7-16]*.

Claim 10

10. The switch of claim 1, wherein the switch is capable of receiving a packet at a first port *[702, Fig. 6; specification pg. 11, lns 14-20]* of a first linecard *[700, Fig. 6; specification pg. 14, lns. 23-27]* destined for a virtual target and formatted in accordance with a first protocol *[specification pg. 11, lns. 21-27; pg. 43, ln. 25 – pg. 44, ln. 2]*, determining if the packet is a data or control packet *[specification pg. 17, lns. 21-24]*, and if the packet is a data packet, sending the packet formatted in accordance with a second protocol to a physical target *[specification pg. 11, lns. 21-27; pg. 43, ln. 25 – pg. 44, ln. 2]*, all at wire speed *[specification pg. 18, lns. 6-8; pg. 24, lns. 7-13]*.

Claim 14

14. The switch of claim 11, wherein the storage service is any one of local mirroring, mirroring over slow link, snapshot, replication, third-party copy, periodic backup, and restore *[specification pg. 6, ln. 25 – pg. 7, ln.12]*.

Claim 15

15. A switch *[304, Fig. 6; specification pg. 11, lns. 14-20]* for use in a network, comprising:

a plurality of linecards *[700, Fig. 6; specification pg. 14, lns. 23-27]*, each linecard including:

a plurality of ports *[702, Fig. 7; specification pg. 16, ln. 26]*;

a plurality of processing units *[701, 704, 706, Fig. 7; specification pg. 17. lns. 11-17]* , wherein each processing unit is associated with at least one port *[702, Fig. 7; specification pg. 15, ln. 29 – pg.16, ln. 1]* and is associated with a memory *[703, Fig. 7; specification pg. 17, lns. 6-10]* ;

a CPU *[714, Fig. 7]* in communication with the processing units *[specification pg. 17, lns 21-25]*; and

a fabric *[608, Fig. 6; specification pg. 15., lns. 26-29]* in communication with each linecard, thereby allowing packets to pass from an ingress linecard to an egress linecard *[specification pg. 15, ln. 29 – pg. 16, ln. 1]*, and wherein the switch processes packets in accordance with storage commands for storing and accessing packets without buffering the packets *[specification pg. 6, lns. 15-22, pg. 18, lns. 12-14, pg. 24, lns. 7-16]*.

Claim 20

20. A switch *[304, Fig. 6; specification pg. 11, lns. 14-20]* for use in a system for storing and accessing data *[300, 402, 404, Figs. 3-5; specification pg. 11, ln. 14 - pg. 12, ln. 22]*, the switch comprising:

a plurality of linecards *[700, Fig. 6; specification pg. 14, lns. 23-27]*, each linecard including:

at least one port *[702, Fig. 7; specification pg. 16, ln. 26]* and a plurality of processing units *[701, Fig. 7; specification pg. 17, lns. 11-13]*, wherein each processing unit is associated with at least one port, and each processing unit includes a classifier *[704, Fig. 7; pg. 17, lns.18-25]*, a virtualizer *[706, Fig. 7, specification pg. 18, lns. 12-14]* and a translator *[706, Fig. 7, specification pg. 18, lns.*

12-14] that classifies, virtualizes, and translates packets at wire speed *[specification pg. 18, lns. 6-8; pg. 24, lns. 7-13]*;

a first CPU *[714, Fig. 7]* in communication with each processing unit *[specification pg. 17, lns 21-25]*; and

a fabric *[608, Fig. 6; specification pg. 15., lns. 26-29]* in communication with each linecard.

Claim 21 (Means plus Function)

21. A switch *[304, Fig. 6; specification pg. 11, lns. 14-20]* for use in a system for storing and accessing data *[300, 402, 404, Fig.s 3-5; specification pg. 11, ln. 14 - pg. 12, ln. 22]*, the switch comprising:

a plurality of linecards *[700, Fig. 6; specification pg. 14, lns. 23-27]*, each linecard including:

at least one port *[702, Fig. 7; specification pg. 16, ln. 26]*, and

means *[701, Fig. 7; pg.17, lns. 11-15]* associated with each port for performing wire speed storage command processing of packets *[specification pg. 6, lns. 15-2; pg. 13, lns. 12-16].*

Claim 24

24. A storage network *[300, 402, 404 Figs. 3-5]*, comprising:

a switch *[304, Fig 6; specification pg. 11, lns. 14-20]* including a plurality of linecards *[700, Fig. 6; specification pg. 14, lns. 23-27]*, each linecard including:

a plurality of ports *[702, Fig. 7; specification pg. 16, ln. 26]*, and

a plurality of storage protocol processing units *[701, Fig. 7; specification pg. 17, lns. 11-13]* , wherein each storage protocol processing unit is associated with at least one port *[specification pg. 17, lns. 11-12]* and performs storage command processing for commands received at said at least one port *[specification pg. 24, lns. 7-16]*; and

a plurality of initiators *[302, Fig. 3; specification pg. 11, ln. 14 – 25; pg. 34, lns. 5-7]* and targets *[306, Fig. 3, specification pg. 11, lns. 25-29; pg. 34, lns. 5-7]*, wherein a first set of initiators and targets operate in accordance with a first protocol and a second set of initiators and targets operate in accordance with a second protocol *[specification pg. 11, lns. 21-27; pg. 43, ln. 25 – pg. 44, ln. 2]*, and

wherein a third set of initiators and targets are local with respect to the switch and a fourth set of initiators and targets are remote with respect to the switch *[Figs. 4-5, specification pg. 12, lns. 1-22]*; and

wherein the switch performs said storage command processing of data packets without buffering said data packets *[specification pg. 6, lns. 15-22; pg. 18, lns. 12-14; pg.24, lns. 7-16; pg. 33. lm. 15-17; pg. 44, lns. 2-7]*.

Claim 35

35. A storage network *[300, 402, 404 Figs. 3-5]*, comprising:

a switch *[304, Fig. 6; specification pg. 11, lns. 14-20]*;

a server *[302, Fig. 3; specification pg. 11, lns. 14-20; pg. 34, lns. 5-7]* in communication with the switch, the server operating in accordance with a first protocol *[specification pg. 43., ln. 25 – pg. 44, ln. 7]*;

a storage device *[306, Fig. 3, specification pg. 11, lns. 26-29]* in communication with the switch, the storage device operating in accordance with a second protocol *[specification pg. 43., ln. 25 – pg. 44, ln. 7]*;

the switch having an input *["port" 702, Fig. 7, specification pg. 16, ln. 26 - pg. 17, ln. 10]* for receiving data for a virtual target formatted in accordance with the first protocol *[specification pg. 11, lns. 21-27; pg. 43., ln. 25 - pg. 44, ln. 2]*; and

the switch having an output *["port" 702, Fig. 7, specification pg. 16, ln. 26 – pg. 17, ln. 10]* for sending the data to a physical target formatted in accordance with the second protocol at wire speed *[specification pg. 17, lns. 11-13; pg. 33, ln. 15 – pg. 34, ln. 3; pg. 43, ln. 25 – pg. 44, ln. 7; pg. 52, lns. 17-23]*.

Claim 42

42. A method *[Figs. 9a-b, 12a-b]* for use by a device *[304, Figs. 3, 6]* in a system for storing and accessing data *[300, 402, 404 Figs. 3-5]*, the method comprising:

receiving *[902, 1202; specification pg. 28, lns. 5-20, pg. 30, lns. 18-26]* a packet from an initiator destined for a virtual target and formatted in accordance with a first protocol *[specification pg. 43., ln. 25 – pg. 44, ln. 7]*;

determining *[904, 1204; specification pg. 28, lns. 20-26, pg. 30, lns. 28-29]* if said packet is a data packet or a control packet *[specification pg. 28, lns. 5 – pg. 29, ln. 3, pg. 30, lns.3-29]*;

forwarding *[916; specification pg. 28, lns. 23-26, pg. 30, lns. 5-7, 28-29]* said packet to a central processing unit if said packet is a control packet; and

sending *[958-960, 1254; specification pg. 33, lns. 15-25]* the packet to a physical target formatted in accordance with a second protocol at wire speed if said packet is a data packet *[specification pg. 43, ln. 25 - pg. 44, ln. 7; pg. 52, lns. 16-20]*.

Claim 43

43. A method *[Figs. 9a-b, 12a-b]* for use by a device *[304, Figs. 3, 6]* in a system for storing and accessing data *[304, 402, 404, Figs. 3-5]*, the method comprising:

receiving *[902, 1202; specification pg. 28, lns. 5-20, pg. 30, lns. 18-26]* a packet from an initiator destined for a virtual target and formatted in accordance with a first protocol *[specification pg. 43., ln. 25 – pg. 44, ln. 7]*;

determining *[904, 1204; specification pg. 28, lns. 20-26, pg. 30, lns. 28-29]* if the packet is a data or control packet *[specification pg. 28, lns. 5 – pg. 29, ln. 3, pg. 30, lns.3-29]*;

if a data packet, sending *[958-960, 1254; specification pg. 33, lns. 15-25]* the packet to a physical target formatted in accordance with a second protocol *[specification pg. 43, ln. 25 - pg. 44, ln. 7; pg. 52, lns. 16-20*; and

wherein all of the above steps are performed without buffering *[specification pg. 6, lns. 15-22; pg. 18, lns. 12-14; pg.24, lns. 7-16]*.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether Claims 1 – 6 and 8 - 44 are unpatentable as obvious under 35 U.S.C. § 103 over U.S. Patent No. 6,400,730 to Latif et al. ("Latif") in view of U.S. Patent No.

6,693,906 to Tzeng et al. ("Tzeng"), as stated on pages 3-7, paragraphs 3-23 of the Office Action.

VII. ARGUMENT

For the reasons set forth below, it is respectfully submitted that the grounds of rejection of the claims are improper and should be reversed.

A. The Cited References Will Not Support a Rejection of the Claims As Being Obvious Under 35 U.S.C. §103

All independent claims, and a number of the dependent claims, recite one of two distinguishing limitations, i.e., that the claimed storage operations are performed either "without buffering" or "at wire speed". The Office rejected all claims as obvious under 35 U.S.C. §103 over the combination of Latif and Tzeng. The Office's position can be summarized briefly as that Latif discloses a switch that performs translation of packets but fails to explicitly disclose that the switch processes packets without buffering, but that Tzeng discloses a network switch that "processes incoming data packets without buffering or at the same rate as the data packets are received" [see Office Action, pgs. 2 – 4]. Thus, as stated in the Office Action, "it would have been obvious to combine the teachings of Latif and Tzeng because doing so would reduce the overall cost of the network switch and enhance switching performance" [see Office Action, pgs. 3 - 4, paragraph 4].

Regardless of whether this might be an acceptable motivation to attempt to combine the references (which Appellants dispute), for the reasons discussed more fully below it is respectfully submitted that the references do not teach or suggest the

claimed invention, cannot be combined as proposed by the Office, and even if combined would not provide an enabling disclosure to support a 35 U.S.C. §103 rejection since they would not place the claimed invention in the possession of the public. Accordingly, the references cannot support a rejection for obviousness under 35 U.S.C. §103.

1. The Prior Art References

a. Latif

Latif relates to a storage network, and discloses a method and apparatus for transferring data between SCSI or Fibre Channel storage devices and IP protocol devices over a network *[Abstract; col. 2, lns. 15-26]*. As illustrated in Figure 5, and as described at col. 2, ln. 55 – col. 3, ln. 5 and col. 3, ln. 46 – col. 4, ln.2, in Latif incoming data packets at an inlet switch port having a first format, e.g., SCSI or Fibre Channel, are converted to an internal format that is used internally by the switch for processing and switching by a switch fabric. After processing and switching by the switch fabric, the packets within the switch which are in the internal format used within the switch are then reconverted back to a native format, e.g., an IP format, at a destination port of the switch that is appropriate for the device connected to that port. Within the switch, packets in one format may be converted into another format, as by encapsulating FCP frames into an Ethernet frame *[col. 8, lns. 10-15]*.

Latif also teaches that each switch 235 *[Fig. 5]* uses a buffer for converted packet frames, and that a management processor adjusts the buffer size so end nodes can communicate with data frames that will fit within an IP packet carried over an Ethernet link *[col. 9, lns. 47-57; col. 10, lns. 18-42]*. Latif further teaches it is

necessary to buffer an entire frame to determine the length and checksum and write these onto a header *[col. 15. lns. 14-16]*. Thus, Latif, explicitly teaches that buffering is a necessary feature of his disclosed switching and routing apparatus and process.

b. Tzeng

Tzeng does not relate to a storage network, but rather to Layer 2 and Layer 3 switching in a packet-switched Ethernet network *[Abstract; col. 3, lns. 32-33]*. As disclosed by Tzeng, switches 12 *[Fig. 1]* include switch ports 20 *[see also Fig. 3]* that include a media access control (MAC) module 22 and a classifier module 24. The MAC module transmits and receives data packets at the physical layer (Layer 2) of the OSI network model, and a switch fabric 25 makes Layer 2 and 3 switching decisions based upon evaluation of an IP data packet within an Ethernet packet *[col. 3, lns. 45-59]*. The packet classifier module 24 compares the incoming data stream against templates to identify the IP data format, e.g., HTTP, SNMP, etc., and based upon the IP format and user-defined policies, the switch makes frame forwarding decisions *[col. 4, lns. 27-41]*. Tzeng does not teach or suggest translating packet protocols.

Although Tzeng discusses reducing buffer sizes and has as an objective providing Layer 2 and Layer 3 switching with "minimal buffering" or "without buffering" to lower the cost of the network switch *[col. 1, ln. 60 – col. 2, ln. 10]*, Tzeng explicitly discloses a buffer memory 28 (SSRAM) in the switch to store data frames while the switch fabric processes forwarding decisions for the received data packets *[col. 3, lns. 60-66]*. Thus, Tzeng does not disclose switching of packets without buffering.

B. The Prior Art Must Enable One Skilled in the Art to Practice the Invention

In order for the prior art to render a claimed apparatus or method obvious under 35 U.S.C. §103, the prior art must enable one skilled in the art to make and use the apparatus or method. See *Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551, 13 U.S.P.Q. 2d. 1301 (Fed. Cir. 1989); citing *In re Payne*, 606 F.2d 303, 314, 203 U.S.P.Q. 245, 255 (CCPA 1979) ("References relied upon to support a rejection under 35 U.S.C. §103 must provide an enabling disclosure, i.e., they must place the claimed invention in the possession of the public").

Here, for the reasons explained in detail below, the cited prior art references do not disclose packet processing as claimed, e.g., storage command processing, without buffering or at wire speed, the references cannot be combined as proposed in the Office Action to produce an operative apparatus or method, and it is not clear how the references could be modified to do so. Nothing in the references teaches how storage command processing of packets, as claimed, could be accomplished. Accordingly, they would not enable one skilled in the art to make or use the claimed switch, storage network or method, and cannot render the claimed invention obvious.

C. The Claims Distinguish Over the References

All independent claims, as well as several dependent claims, recite one of two limitations, i.e., that the switch, network, or method operates to perform the particular type of packet processing claimed in each claim either "without buffering" or "at wire speed". It is respectfully submitted that these limitations are neither taught nor suggested by the cited prior art, and that these limitations, at least, distinguish over

this prior art. For the reasons which follow, it is submitted that the rejections of the claims under 35 U.S.C. §103 based upon Latif and Tzeng are improper and should be reversed.

1. Claim 1

Claim 1 is directed to a switch for use in a storage network, and recites (in relevant part):

> a plurality of storage protocol processing units, wherein each storage protocol processing unit is associated with at least one port and performs storage command processing for commands received at said at least one port, . . . and wherein the switch performs said storage command processing of packets without buffering the packets (emphasis added)

As described above, while Latif relates to a switch in a storage network, Latif's switch employs a predetermined internal format such that all incoming packets at a switch port are converted to the internal switch format, processed and routed by the switch, and then reconverted at an output port to another native format of a device connected to that port. As recognized by the Office *[see Office Action pg. 3, paragraph 4]* Latif does not disclose processing without buffering packets. Rather, Latif explicitly discloses buffers in the switch for buffering incoming packets for encapsulation in frames for routing and processing within his switch *[see col. 9, lns. 47- 57, col. 10, lns. 18-42]*.

Tzeng, on the other hand, does not relate to a storage switch or network, but rather to an Ethernet data network switch and does not disclose storage command processing of packets. Tzeng does not disclose or teach one skilled in the art how to implement a switch for storage command processing packets without buffering.

a. The References Do Not teach or Suggest the Claimed Invention and Would Not render the Claimed Invention Predictable

Contrary to the Office's position in its rejection *[Office Action pg. 3, paragraph 4]*, Tzeng does not disclose at col. 1, ln. 39 – col. 2, ln. 16 a switch "without buffering". Rather, Tzeng merely discusses at col. 1, ln. 39 – col. 2, ln. 16 the drawbacks of buffers and the desirability of providing Layer 2 and Layer 3 switches with minimal or no buffering. Tzeng merely states a problem with existing Ethernet network switches and a desired objective to minimize the problem, but does not disclose or suggest how to implement a switch with no buffering of packets as claimed.

Thus, the combination of Latif and Tzeng would not enable one skilled in the art to make and use a switch comprising a plurality of storage protocol processing units for performing storage command processing for commands received at a port without buffering of packets, as claimed.

b. The References Cannot Be Combined As Proposed

Even if it is accepted (for purposes of argument only) that Tzeng does suggest a switch without buffering, it is respectfully submitted that Latif and Tzeng could not be combined to produce an operative switch, and it is not even clear how one skilled in the art could modify the teachings of Latif and Tzeng and combine them to implement an operative switch. In fact, it is submitted that the teachings of the prior references would not enable one skilled in the art to make and use the claimed invention. As noted above, Latif converts incoming packets into an internal format,

packs them into a frame, and expressly requires a buffer for processing and routing of the packets within the switch. Tzeng's "suggestion" of no buffering is incompatible with Latif's requirement for buffering. Thus, in order to combine Tzeng's suggestion into Latif's switch, it would be necessary to redesign Latif's switch to eliminate the buffer. This which would require substantial modification and reconstruction of Latif's the switch, and require use of different processing from that disclosed by Latif which does not encapsulate packets into frames and does not depend upon buffering. There is no teaching in the references as to how one could accomplish this redesign, and it is not even clear how or whether Latif could be modified and reconstructed to eliminate buffering. The Office has offered no explanation in its rejection as to how these incompatible teachings may be reconciled, but rather has merely offered unsupported assertions that it would be obvious to combine the references.

Thus, it is submitted that the cited prior art does not enable one skilled in the art to make and use the invention of Claim 1 and cannot support a rejection based upon obviousness. Accordingly, the rejection should be reversed.

c. Claims 2-6 and 8-14

Claims 2-6 and 8-14 depend from Claim 1 and are deemed allowable over the cited prior art for at least the same reasons that Claim 1 is allowable. Moreover, Claims 8 – 14 distinguish over the prior art for other reasons.

i. Claims 8 and 10

Claims 8 and 10 recite that the switch is capable of processing packets at wire speed. This "wire speed" limitation is the other previously-mentioned distinguishing

limitation which is present in independent Claims 20, 21, 35 and 42. Accordingly Claims 8 and 10 distinguish over the prior art for at least the same reasons as Claims 20, 21, 35 and 42 distinguish, as will be discussed below.

ii. Claims 9 and 10

Claims 9 and 10 recite that the switch receives a packet for a virtual target and that is formatted according to a first protocol, determines if the packet is a data or control packet, and, if a data packet, sends the packet formatted according to a second protocol to a physical target. Claim 9 further recites that the switch performs the operations "without buffering", and Claim 10 further recites that the switch performs the operations "at wire speed".

These operations claimed in Claims 9 and 10 are storage operations that comprise "translation" (converting a packet from a first protocol to a second protocol), "virtualization" (converting from a virtual address to a physical address), and "classification" (identifying a packet as a control or a data packet), as defined in the specification and as described above. The prior art does not teach or suggest a switch in a storage network that translates, virtualizes or classifies packets, as claimed, either without buffering or at wire speed. Accordingly Claims 9 and 10 are allowable for these reasons also.

iii. Claim 14

Dependent Claim 14 recites that the switch performs a storage service comprising one of local mirroring, mirroring over a slow link, snapshot, replication, third-party copy, periodic backup and restore. Contrary to the Office's assertion

[Office Action. Pg. 6, para. 16], Latif does not disclose such operations at col. 1, lns. 25-40, or elsewhere. Rather, Latif at col. 1, lns. 25-40 merely describes the desirability of having multiple servers access multiple storage devices (which all storage networks, such as SANs, do), and the desirability of being able to use other than Fibre Channel devices. This has nothing to do with the claimed storage services of local mirroring, mirroring over a slow link, snapshot, replication, third-party copy, periodic backup and restore. Latif does not disclose or even suggest these storage operations set out in Claim 14. Accordingly, the references cannot render Claim 14 obvious for this reason also, and the rejection of Claim 14 should be reversed.

2. Claims 15 – 19

Independent Claim 15 is directed to a switch in a network, and is similar to independent Claim 1 in reciting that the switch "processes packets in accordance with storage commands for storing and accessing packets without buffering the packets". Thus, Claim 15 is deemed allowable for the same reasons discussed above in connection with Claim 1, and Claims 16-19 are deemed allowable for at least the same reasons Claim 15 is allowable.

3. Claim 20

Claim 20 is directed to a switch for storing and accessing data, and recites, in part:

> at least one port and a plurality of processing units, wherein each processing unit is associated with at least one port, and each processing unit includes a classifier, a virtualizer, and a translator that classifies, virtualizes, and translates packets <u>at wire speed</u> (emphasis added)

Neither Latif nor Tzeng teach a plurality of processing units, each of which includes a classifier, a virtualizer and a translator that classifies, virtualizes and translates packets, as claimed, and neither reference teaches or suggests performing such operations "at wire speed".

The specification defines the term "wire speed" processing *[specification pg. 6, lns.15-22, pg. 13, lns.12-16]* to mean that the switch processes packets without introducing any more latency than would be introduced by a switch that merely performed switching or routing functions, which requires a switch that does not buffer packets. Thus, the term "wire speed" as used in the claims means that packets are processed without buffering.

Accordingly, since Latif and Tzeng do not teach or suggest a plurality of processing units, each of which includes a classifier, a virtualizer and a translator that classifies, virtualizes and translates packets processing packets without buffering, the references cannot render Claim 20 obvious.

4. Claims 21 - 23

Independent Claim 21 is directed to a switch for use for storing and accessing data and recites "means associated with each port for performing wire speed storage command processing of packets". It is submitted that the rejection of Claim 21 is improper and should be reversed because: (1) the Office has failed to establish a *prima facie* case for the rejection, and (2) the prior art does not teach or suggest the claimed means for performing wire speed storage command processing of packets.

a. The Office Failed to Properly Construe Claim 21 in Accordance With 35 U.S.C. §112, ¶6

The "means" limitation of Claim 21 is a means plus function element and must be construed in accordance with 35 U.S.C. §112, ¶6. The statute requires that this element be construed as corresponding to the structure disclosed in the specification for performing the claimed function and equivalents of that structure, and the Office must apply this standard in construing the claim and formulating a rejection. *[see In re Alappat,* 33 F.3d 1526, 31 U.S.P.Q. 2d 1545 (Fed Cir. 1994) "[T]he PTO is not exempt from following the statutory mandate of 35 U.S.C.§112, ¶6 . . .", citing *In re Donaldson,* 16 F.3d 1189, 29 U.S.P.Q. 2d 1845 (Fed. Cir. 1994)(in banc)*]*.

The Office failed to properly construe the "means" element of Claim 21 since it did not identify the structure in the specification that performs the claimed function, or point to corresponding or equivalent structure in the references. Thus, the Office failed to set out a *prima facie* case for the rejection of Claim 21, and the rejection should be reversed for this reason alone.

b. The References Do Not Teach or Suggest Structure Corresponding or Equivalent to That Claimed Which Performs Storage Command Processing at Wire Speed

For the same reasons pointed out above in connection with Claims 1, 15 and 20, the references do not teach or suggest wire speed storage command processing of packets as set forth in Claim 21, and, therefore, do not teach or suggest any structure corresponding or equivalent to the means element of Claim 21 that performs storage command processing of packets at wire speed. Accordingly, the references cannot render Claim 21 or the Claims 22-23 dependent thereon obvious. Accordingly, the rejections of these claims should be reversed for this reason also.

5. Claims 24 – 34

Independent Claim 24 is directed to a storage network that comprises a switch, and recites that the switch performs storage command processing of data packets without buffering the data packets. Claim 24 and the claims dependent thereon are deemed allowable over the cited references for the same reasons pointed out above in connection with Claims 1 and 15, and the rejections of these claims should be reversed for the same reasons set out above.

i. Claims 27 – 29

Dependent Claims 27 and 28 both recite that the switch processes data packets to including "virtualization and translation". Claim 27 recites that it does so without buffering the data packets, and Claim 28 recited it does so at wire speed. As pointed out above in connection with Claims 1 and 15, the prior art does not teach or suggest processing "without buffering", and as pointed out in connection with Claim 20, the prior art does not teach or suggest "wire speed processing". Thus, Claims 27 – 29 are also deemed allowable for these reasons, and it is submitted that the rejections of these claims should be reversed.

6. Claims 35 – 41

Independent Claim 35 is directed to a storage network that comprises a switch, a server operating in accordance with the first protocol, and a storage device operating in accordance with a second protocol, and recites that the switch receives data for a virtual target formatted in accordance with the first protocol and has an output for sending the data to a physical target formatted in accordance with the

second protocol at wire speed. Claim 35 thus recites both the virtualization function (converting) received data for a virtual target to a physical target, as well as translation, translating received data having a first protocol to a second protocol, and recites that the virtualization and translation functions are performed at wire speed.

For the same reasons set out above in connection with Claims 1, 15, 20 and 24, it is submitted that the rejections of Claims 35 – 41 should be reversed.

7. Claim 42

Independent Claim 42 is directed to a method for use by a device in a system for storing and accessing data, and recites receiving from an initiator a packet formatted in accordance with a first protocol and destined for a virtual target, determining if the packet is a data packet or a control packet (i.e., classifying the packet); and sending the packet to a physical target formatted in accordance with the second protocol (i.e., vitualization and protocol translation) if the packet is a data packet.

Thus, Claim 42 recites all three of the storage functions of classification of packets as data packets or control packets, virtualization by converting an incoming packet for a virtual target to an outgoing packet for a physical target; and translating the incoming packet from a first protocol to an outgoing packet at a second protocol, and where such functions are preformed at wire speed. Since the references do not teach or suggest classification, translation, or virtualization at wire speed, for the same reasons pointed out above in connection with Claim 20, the references cannot render Claim 42 obvious, and the rejection of Claim 42 should be reversed.

8. Claims 43 – 44

Independent Claim 43 is directed to a method for use in a device for storing and accessing data, and is substantially the same as Claim 42 except that it recites that all of the processing steps of virtualization, classification and translation are performed without buffering. Since the references do not teach or suggest a switch performing the classification and virtualization functions without buffering, the references cannot render the invention of Claim 43 obvious. Accordingly, it is submitted that the rejections of Claims 43 and 44 should also be reversed.

VIII. CONCLUSION

For the foregoing reasons, it is respectfully submitted that the rejections of Claims 1 - 6 and 8 - 44 are improper, unsustainable, and should be reversed.

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Respectfully Submitted,

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CLAIMS APPENDIX

1. A switch for use in a network, comprising:

a plurality of linecards, each including:

a plurality of ports; and

a plurality of storage protocol processing units, wherein each storage protocol processing unit is associated with at least one port and performs storage command processing for commands received at said at least one port, thereby distributing processing resources amongst linecard ports, and wherein the switch performs said storage command processing of packets without buffering the packets.

2. The switch of claim 1, wherein additional linecards can be added to the plurality of linecards.

3. The switch of claim 1, wherein linecards can be removed from the plurality of linecards.

4. The switch of claim 1, wherein each linecard is designed to handle packets formatted in accordance with any respective one of a plurality of protocols.

5. The switch of claim 4, wherein:

a first set of linecards in the plurality is designed to send and receive packets in accordance with an iSCSI protocol; and

a second set of linecards in the plurality is designed to send and receive packets in accordance with a Fibre Channel protocol.

6. The switch of claim 4, wherein one of the plurality of protocols is Infiniband.

8. The switch of claim 1, wherein the switch is capable of processing packets at wire speed.

9. The switch of claim 1, wherein the switch is capable of receiving a packet at a first port of a first linecard destined for a virtual target and formatted in accordance with a first protocol, determining if the packet is a data or control packet, and if the packet is a data packet, sending the packet formatted in accordance with a second protocol to a physical target, all without buffering the packet.

10. The switch of claim 1, wherein the switch is capable of receiving a packet at a first port of a first linecard destined for a virtual target and formatted in accordance with a first protocol, determining if the packet is a data or control packet, and if the packet is a data packet, sending the packet formatted in accordance with a second protocol to a physical target, all at wire speed.

11. The switch of claim 1, wherein the switch is capable of performing a storage service at the request of a second device without any additional involvement

of the second device.

12. The switch of claim 11, wherein the second device is a server.

13. The switch of claim 11, wherein the second device is a management station.

14. The switch of claim 11, wherein the storage service is any one of local mirroring, mirroring over slow link, snapshot, replication, third-party copy, periodic backup, and restore.

15. A switch for use in a network, comprising:

a plurality of linecards, each linecard including:

a plurality of ports;

a plurality of processing units, wherein each processing unit is associated with at least one port and is associated with a memory;

a CPU in communication with the processing units; and

a fabric in communication with each linecard, thereby allowing packets to pass from an ingress linecard to an egress linecard, and wherein the switch processes packets in accordance with storage commands for storing and accessing packets without buffering the packets.

16. The switch of claim 15, wherein:

each processing unit includes a packet aggregation and classification unit and a packet processing unit; and

the associated memory includes a CAM and an SRAM.

17. The switch of claim 15, wherein the associated memory is included in the processing unit.

18. The switch of claim 15, wherein the associated memory is associated with each processing unit.

19. The switch of claim 15, wherein the switch further includes a traffic manager in communication with each processing unit.

20. A switch for use in a system for storing and accessing data, the switch comprising:

a plurality of linecards, each linecard including:

at least one port and a plurality of processing units, wherein each processing unit is associated with at least one port, and each processing unit includes a classifier, a virtualizer, and a translator that classifies, virtualizes, and translates packets at wire speed;

a first CPU in communication with each processing unit; and

a fabric in communication with each linecard.

21. A switch for use in a system for storing and accessing data, the switch comprising:

a plurality of linecards, each linecard including:

at least one port, and

means associated with each port for performing wire speed storage command processing of packets.

22. The switch of claim 21, wherein processing of packets includes at least one of data packet virtualization and data packet protocol translation.

23. The switch of claim 22, wherein processing of packets further includes classifying packets as data packets or control packets.

24. A storage network, comprising:

a switch including a plurality of linecards, each linecard including:

a plurality of ports, and

a plurality of storage protocol processing units, wherein each storage protocol processing unit is associated with at least one port and performs storage command processing for commands received at said at least one port; and

a plurality of initiators and targets,

wherein a first set of initiators and targets operate in accordance with a first protocol and a second set of initiators and targets operate in accordance with a second protocol, and

wherein a third set of initiators and targets are local with respect to the switch and a fourth set of initiators and targets are remote with respect to the switch; and wherein the switch performs said storage command_processing of data packets without buffering said data packets.

25. The storage network of claim 24, wherein the first set, the second set, the third set, and the fourth set are not mutually exclusive.

26. The storage network of claim 24, wherein the storage network includes a plurality of switches, each switch including a plurality of linecards, each linecard including a plurality of ports and a plurality of processing units, wherein each processing unit is associated with at least one port, wherein some of the switches are remotely located with respect to other switches.

27. The storage network of claim 24, wherein the switch is designed to process data packets, including virtualization and translation, without buffering the data packets.

28. The storage network of claim 24, wherein the switch is designed to process data packets, including virtualization and translation, at wire speed.

29. The storage network of claim 24, wherein each linecard is designed to handle packets formatted in accordance with any respective one of a plurality of

protocols.

30. The storage network of claim 24, wherein additional linecards can be added to the plurality of linecards.

31. The storage network of claim 24, wherein linecards can be removed from the plurality of linecards.

32. The storage network of claim 24, wherein the storage network includes a plurality of switches, each including a plurality of linecards, each including a plurality of ports and a plurality of processing units, wherein each processing unit is associated with at least one port, and wherein additional switches can be added to the plurality of switches.

33. The storage network of claim 24, wherein the storage network includes a plurality of switches, each including a plurality of linecards, each including a plurality of ports and a plurality of processing units, wherein each processing unit is associated with at least one port, and wherein additional switches can be removed from the plurality of switches.

34. The storage network of claim 24, wherein the storage network includes a plurality of switches, each including a plurality of linecards, each including a plurality of ports and a plurality of processing units, wherein each processing unit is

associated with at least one port, wherein only one management station is required to manage the plurality of switches.

35. A storage network, comprising:

a switch;

a server in communication with the switch, the server operating in accordance with a first protocol;

a storage device in communication with the switch, the storage device operating in accordance with a second protocol;

the switch having an input for receiving data for a virtual target formatted in accordance with the first protocol; and

the switch having an output for sending the data to a physical target formatted in accordance with the second protocol at wire speed.

36. The storage network of claim 35, wherein the switch includes a plurality of linecards, each linecard including a plurality of ports and a plurality of processing units, wherein each processing unit is associated with at least one port.

37. The storage network of claim 35, including a plurality of switches.

38. The storage network of claim 37, wherein only one management station is required to manage the plurality of switches.

39. The storage network of claim 37, wherein some of the switches are remotely located with respect to other switches.

40. The storage network of claim 35, wherein the server is remotely located with respect to the switch.

41. The storage network of claim 35, wherein the storage device is remotely located with respect to the switch.

42. A method for use by a device in a system for storing and accessing data, the method comprising:

receiving a packet from an initiator destined for a virtual target and formatted in accordance with a first protocol;

determining if said packet is a data packet or a control packet;

forwarding said packet to a central processing unit if said packet is a control packet; and

sending the packet to a physical target formatted in accordance with a second protocol at wire speed if said packet is a data packet.

43. A method for use by a device in a system for storing and accessing data, the method comprising:

receiving a packet from an initiator destined for a virtual target and formatted in accordance with a first protocol;

determining if the packet is a data or control packet;

if a data packet, sending the packet to a physical target formatted in accordance with a second protocol; and

wherein all of the above steps are performed without buffering.

44. The method of claim 43, wherein all of the steps are further performed at wire speed.

EVIDENCE APPENDIX

NONE

RELATED PROCEEDINGS APPENDIX

NONE